



# EGYPTIAN UNIVERSITIES TRAINING SATELLITE SUMMER TRAINING 2021



## ANOMALY DETECTION FOR SATELLITE TELEMETRY DATA

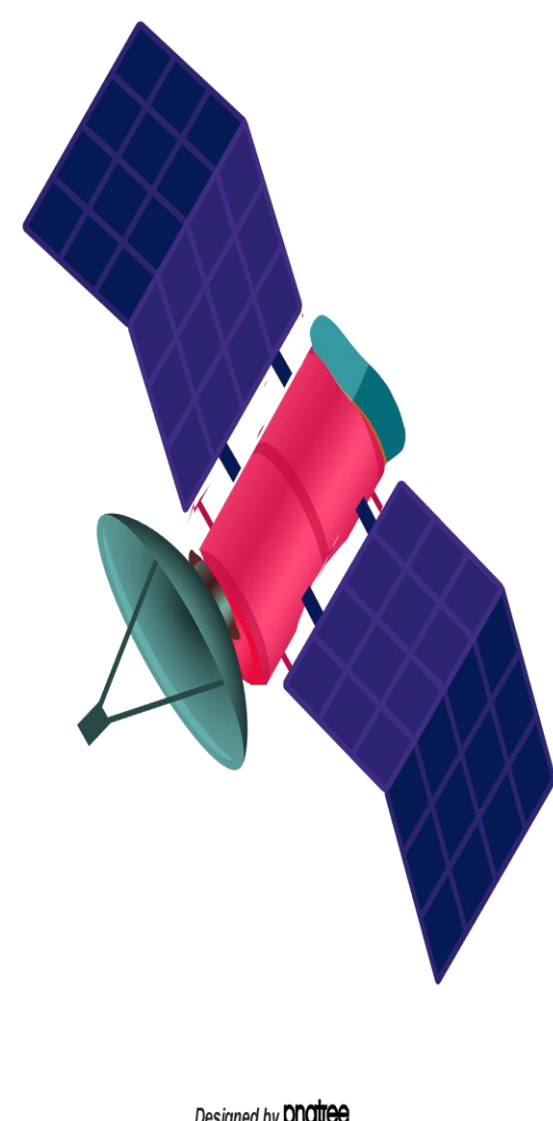
### T42 - COMPUTER AND ARTIFICIAL INTELLIGENCE HELWAN UNIVERSITY

#### Introduction

#### What is Telemetry Data?

##### Telemetry Definition:

Telemetry is the automated communication processes from multiple data sources. Telemetry data is used to improve customer experiences, monitor security, application health, quality, and performance.



#### Dataset Description

Our Datasets consist of Two CSV file

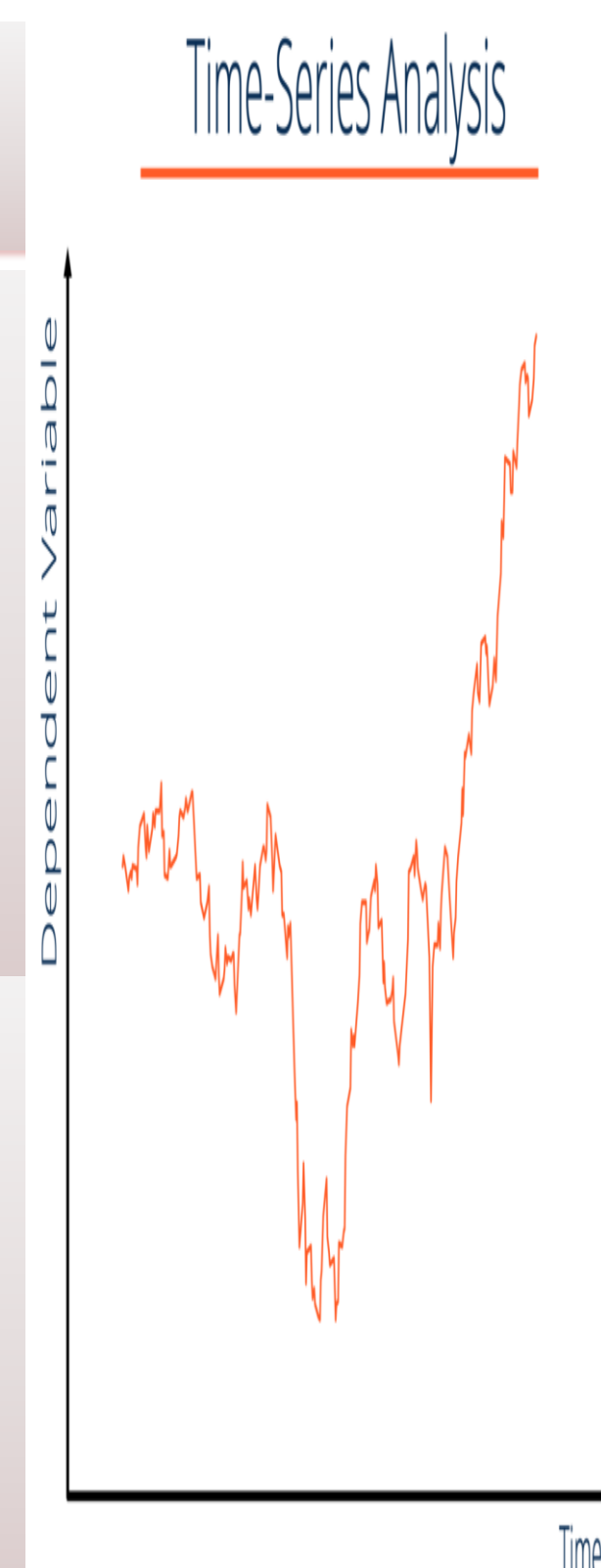
- first file with Colum date and Temperature
- Second file with Two columns Date and Sunspots

#### What is Time Series?

**A time series** is a sequence of data points that occur in successive order over some period of time

##### It Include Analysis AS:

- Time Series Analysis
- Time Series Forecasting



#### Project Aim

The Project aim to analysis and predict Temperature data that come from satellite Over interval of time through various time series analysis Algorithms

#### Requirements and tools

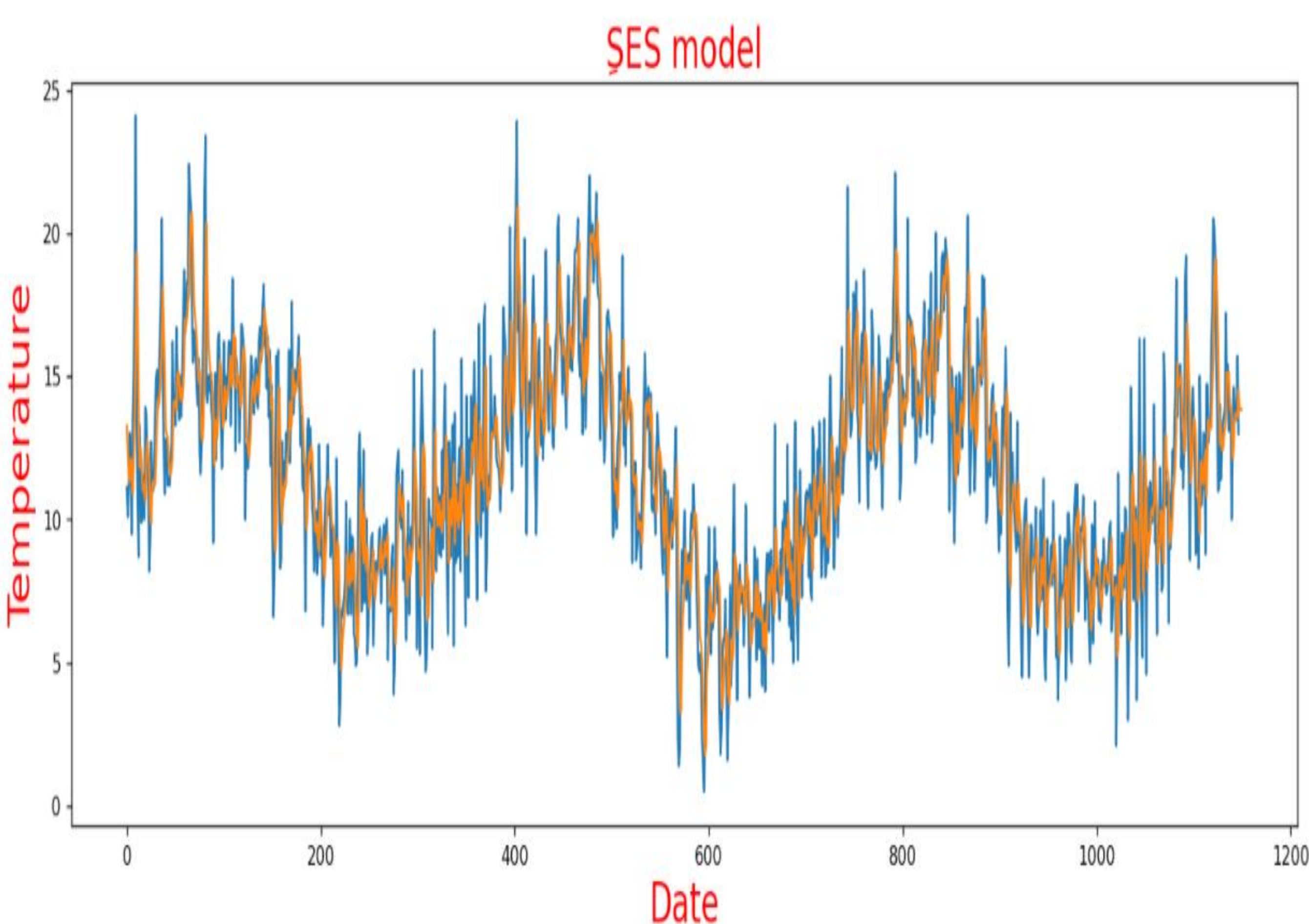
- For our work, our implementation language is Python 3
- Using Library as:
  - Pandas Library For Data Manipulation Processing
  - NumPy Library For Array manipulation
  - Matplotlib Library For Data Visualization
  - Scikit-learn Library for calculate Mean square error between Actual and Predicted data
  - Statsmodels Library For ARIMA & ARMA
- Our Work Done Under Jupiter environment

#### Working Plan and Algorithms Used

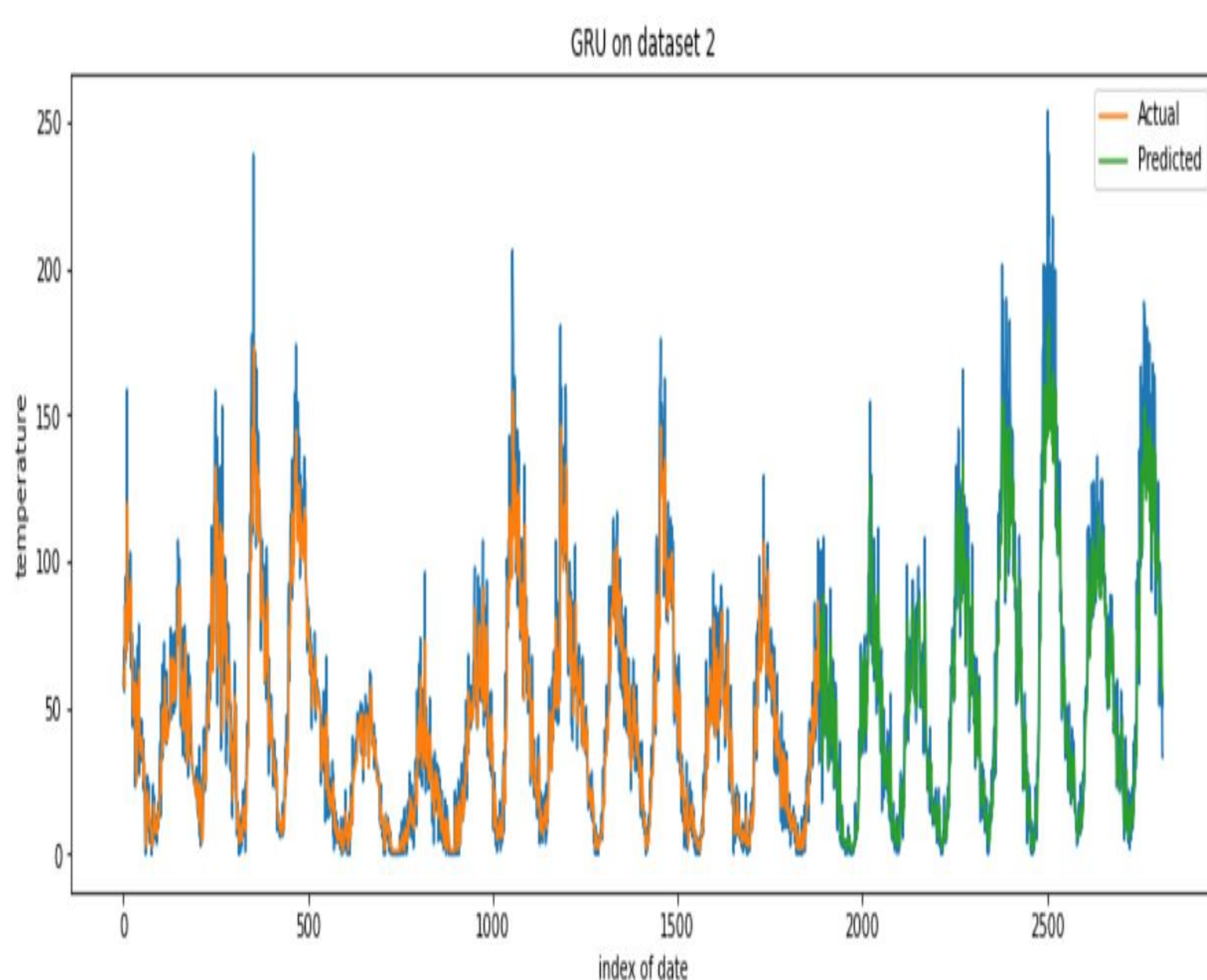
#### 1-Data Analysis And Preprocessing

Our first step was Clean and Analysis datasets, In Cleaning data set we depends on Remove missing value from dataset and change data type for some columns in the data

#### Simple Exponential Smoothing



#### GRU Algorithm



#### Conclusion

- We learnt about time series data, data analysis and unsupervised machine learning models used on time series data for anomaly detection.
- Best Algorithm that predict data based on mean square error
- For Dataset 1 is :
- For Dataset 2 is :

#### The Team Behind this Work

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